

## Dinosaurs of the Connecticut Valley

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*Dinosaurs lived in the Connecticut Valley during the Late Triassic and Early Jurassic periods, between one hundred and one hundred eighty million years ago. Footprints have been found in large quantities, particularly in the Connecticut region and can be viewed in Rocky Hill's Dinosaur State Park. Skeletal remains are rare, because of poor preservation conditions in the area. Dinosaurs can be classified into two major subcategories, the Saurischia and the Ornithischia. The Saurischia were less evolved than the Ornithischia, who tended to have more bird like characteristics. Fossil and footprint records indicate that a wide variety of dinosaurs once lived in the Connecticut Valley Region. These dinosaurs include the Anchisaurus polyzelus, the Ammosaurus major, the Coelophysis, the Gallator, the Eubrontes, the Stegomas, and the Hypsognathus, among others. Although there is no definite answer as to why the dinosaurs became extinct, scientists hypothesize that they could not adapt to the changing climate and therefore, over the course of several million years, died out.*

### History of the Connecticut Valley

New England, specifically the Connecticut Valley is home to approximately four kilometers of sediments and tholeiitic basalt from the Late Triassic and Early Jurassic Periods. This sediment is the result of the separation of the North American and African continents (McDonald, 1992). At the time that this sediment was deposited in the Mesozoic or Secondary Era, the Age of the Reptiles, chiefly land dinosaurs was in full swing. In the Connecticut Valley, dinosaurs lived predominately in the Late Triassic and Early Jurassic Epochs. Through radioactive methods, scientists date these periods to be between one hundred and one hundred eighty million years ago (Marshak, 2005).

Connecticut as we know it today, which exists between the latitudes of forty one and forty two degrees North on the Eastern side of the North American land mass did not always exist. Due to the motion of plates under the theory of plate tectonics, continents and oceans move together. The outer layer of Earth, the lithosphere, consists of separate plates that move in respect to one another. New crust is produced at mid-oceanic ridges, and old crust is destroyed in subduction zones. Plates can drift

apart, slide past each other, or slide under each other. Therefore, in accordance with the theories of plate tectonics, Connecticut used to be located at a lower latitude closer to the equator, allowing for the existence of a tropical climate. This climate allowed for the development of dinosaurs which flourished in warm, tropical environments (Marshak 2005).

### Outline of the Connecticut Valley

In the beginning of the nineteenth century, scientists began to uncover and excavate fossils and track ways that were deposited in the Connecticut Valley region, particularly fish, and dinosaur footprints. In fact, the first dinosaur fossils from the East Coast were found in the Connecticut Valley, which encompasses one hundred seventy eight kilometers of land from Northfield, Massachusetts near the edge of New Hampshire to the Long Island Sound at New Haven, Connecticut (Weishampel and Young, 1996).

The Connecticut Valley is divided into the Hartford Basin in Connecticut and the Deerfield Basin in Massachusetts. These basins continue to be divided by Paleozoic bedrock, which has survived the past two hundred million years by resisting physical and chemical weathering.

Though no dinosaur fossils have ever been found in the oldest parts of the Connecticut Valley, which include the New Haven Arcose and the Sugarloaf Arcose, the Hartford Basin has preserved almost the entire track record of Connecticut Valley dinosaurs. Reptile footprints are preserved in red sandstone while the fossil remains of dinosaurs, fishes, and plants are preserved in rocks that at one time were black and gray mud on the shores and in the bottoms of lakes (Weishampel and Young, 1996). Dinosaur State Park, located in Rocky Hill, Connecticut, has an exceptional display of dinosaur track ways from the dinosaurs found in the area over two hundred million years ago. It is one of the largest preservations of track ways in North America.

The skeletal remains of reptiles in Mesozoic rocks in the Connecticut Valley are very rare, however, they do exist. Upon discovery, these skeletal remains are often very fragmented and are found mostly in the coarse red bed in the New Haven and Portland Formations (McDonald, 1992). In order for organic materials, such as skeletons, to be preserved, a bone must be buried rapidly under a thick layer of sediment. This deposition of sediment can develop during a flash flood or in a mountain stream and serves to seal off the bone from the atmosphere. By sealing a bone off from the atmosphere, it prevents the oxidation that occurs when the bone reacts with the air and decays. While buried, the dissolved minerals in the sediment seep into the bones and partially replace its organic tissue (Dinosaur State Park Exhibit). In the Connecticut Valley, bones were not preserved well for the most part because they were exposed to the air too long after the death of the dinosaur and were subject to too much oxidation, therefore decaying.

### **Classification of Dinosaurs**

Dinosaurs can be classified into two major

subcategories: the Saurischia or the *Theropoda*, which were carnivorous, and the Ornithischia or the *Ornithopoda*, which were more highly evolved. The Saurischia were two legged and for the most part were flesh eaters. Many of them had large skulls, dagger like teeth, and strong jaws. They preyed upon some large herbivores. The two suborders of the Saurischia include the carnivorous dinosaurs, the Theropoda, and the amphibious dinosaurs, the Sauropoda dinosaurs. The Ornithischia were, on a whole, more evolved than Saurischian forms of dinosaurs. The two suborders of Ornithischia dinosaurs were the beaked dinosaurs, the Ornithomimidae, and the armoured dinosaurs, the Ornithomimidae (Swinton, 1934). The Ornithischians had a rotated pubic bone, indicating the advanced position of the Ornithischians in comparison to the Saurischians. These dinosaurs were partially bipedal and partially quadrupedal and reached the height of their development during the Cretaceous period. They were water-loving animals that were duck billed because their skull and jaw were broadened and flat. Many had webbing between their toes and ranged in size from small to medium (Colbert, 1945).

The Carnivorous dinosaurs, Theropods, ranged in size from small, as in one foot, to very large, as in forty feet. Some dinosaur remains found led scientists to believe some could even have been larger than forty feet. These bi-pedal creatures primarily had large skulls that were deep and laterally compressed with teeth ranging from three to six inches long. Carnivorous dinosaurs existed in the Early Triassic through the close of the Cretaceous periods. While examining the evolution of the dinosaurs from the Early Triassic through the close of the Cretaceous, there is a clear evolution of more efficient kinds of dinosaurs and an increase in the size of the dinosaurs. Following that pattern, the early Triassic

carnivores were smaller than those of later time periods. Evidence of the carnivores has been found mainly in the Connecticut Valley Region, where footprints have been preserved in sandstone (Swinton, 1934). The large dinosaurs included Megalosaurus, Plateosaurs, Scleromochlus and Tyrannosaurs, all of which are found in the Connecticut Valley region.

Another suborder of dinosaurs is the group of amphibious dinosaurs or the Sauropoda. Best characterized by their reptile feet, these dinosaurs are the most familiar dinosaurs to the general public because of their large size and seemingly monstrous portrayal. The amphibious dinosaurs ranged in geological time from the Jurassic to the end of the Lower Cretaceous, however, some forms existed in the Upper Cretaceous period but at lower latitudes. The amphibians were large, plant eating dinosaurs with long necks, long tails and short bodies. Their skulls were disproportionately small and they had slightly pointed teeth. Their pointed teeth, coupled with a weak jaw, created an inefficient method of chewing and therefore limited their food to water-weed lagoons and marshes (Swinton, 1934).

Another suborder, the beaked dinosaurs, the Ornithomimidae, were known as bird footed dinosaurs because of their three toed feet, which resembled Struthionian birds. Their bird-like characteristics, including the presence of a beak, their post-pubis and sacrum structure, the proportions of their skulls, the shoulder and hip-girdles, and their hind limb, it is suggested that these dinosaurs are the ancestors of present day birds. The earliest traces of these dinosaurs are found in footprints from Triassic and lived throughout the Upper Cretaceous period (Swinton, 1934).

The final suborder of dinosaurs, the armored dinosaurs, the Ornithomimidae share many features similar to those classified as Ornithomimidae but differ in that they are quadrupedal animals

protected by heavy, bony plates, bosses, or spines. However, they do share many of the bird-like characteristics of the Ornithomimidae, including the horny beak, teeth, structure of the pelvis, and the fore and hind limbs. The earliest known armored dinosaurs existed in the Lower Jurassic period and were even present in the closing stages of the Cretaceous. By the time that they had evolved, even the biggest dinosaurs most likely did not exceed twenty-five or thirty feet in length (Swinton, 1934).

### **Overview of Dinosaurs Found in the Connecticut Valley**

The best-known species in the Connecticut Valley region are the prosauropod dinosaurs, which include the *Anchisaurus polyzelus* and the *Ammosaurus major*. The *Anchisaurus* was a bipedal dinosaur between two and two and a half meters and was slender footed (McDonald, 1992). The *Anchisaurus polyzelus*, previously known as the *Anchisaurus colurus*, is the most complete and best preserved skeleton of a prosauropod dinosaur in North America at any given time in history (Colbert, 1945). The *Anchisaurus polyzelus* spent most of its time on its hind legs, had enormous claws, and is the closest to being purely bipedal as compared to the rest of the dinosaurs (Colbert, 1945). The *Ammosaurus* was a sand lizard that grew approximately four meters long and looked like many other prosauropod with a long neck and tail, short hind legs, strong forelegs, and a round front body. Along with the *Anchisaurus*, they were the dominant large herbivores of the East Coast during the Early Jurassic Period. Both had slender teeth and lightly built skulls (Colbert, 1945).

The dinosaur originally named the *Podokesaurus* but currently known as the *Coelophysis*, exists today in at least two fragmentary skeletons from the Portland formation. A tooth has also been found in the

Shuttle Meadow Formation. The *Coelophysis* was also a bipedal dinosaur, active and lightly built, that ranged between one to two meters in length. Its diet probably consisted of insects, smaller reptiles, and probably fish.

The *Grallator* was a small, three-toed, bipedal, meat-eating theropod, approximately two to six meters long (Weishampel and Young, 1996). *Grallator* tracks have been found in New York and New Jersey and were typically small footprints. These dinosaurs existed in the Late Triassic Early Jurassic period of the East Coast and fall under the category of a Ceratosaurian Theropod.

*Eubrontes* tracks are typically found in flagstone and produce large footprints. Both *Eubrontes* and *Grallator* footprints have been found in the Shuttle Meadow Formation of the Hartford Basin along with a single tooth from a small theropod. Most of the *Eubrontes* tracks have been found in Rocky Hill and represent the first large theropod on the East Coast. The *Eubrontes* were large, running dinosaurs whose speeds went up to almost five meters per second, or approximately ten miles per hour. At Dinosaur State Park, *Eubrontes* footprints are complete with pads, claw and heel marks but no toe impressions, indicating that the animal must have swam in shallow water. Both the *Grallator* and *Eubrontes* dinosaurs were social and perhaps even hunted in packs. At Dinosaur State Park there are eighty-six track ways, most of which are *Eubrontes*. These tracks suggest that large theropods ambled across the mudflat over a long period of time in groups of herds (Weishampel and Young, 1996).

*Stegomus* dinosaurs walk close to the ground on four legs and may have been an herbivore, feeding mostly on roots and other plants. They were three to four meters long and

were heavily armored and agile with small, lightly built skeletons (Dinosaurs Weishampel and Young, 1996). *Hypsognathus* were Procolophonid reptiles, found in New Jersey. They were small plant-eating predecessor to modern day reptiles, they were found in New Jersey and Connecticut.

### **Dinosaur Extinction**

The Cretaceous-Tertiary extinction of dinosaurs was one of the most dramatic, mass wipe outs of all time. Although the cause of their extinction is not known for sure, scientists hypothesize that it revolved around climate change, caused by changes in volcanism, shifts in positions of the continents, and the loss of mid-continental oceans. The process of extinction was a slow one, occurring over several million years, as scientists assume that dinosaurs gradually became unable to adapt to changing environmental conditions (Weishampel and Young, 1996).

### **Conclusion**

Connecticut Valley dinosaurs that have been found by matching fossils and footprints have included the *Atreipus*, *Gregaripus*, *Anomoepus*, *Grallator*, *Kayentapus*, *Anchisaurus*, *Tenontosaurus*, and *Ornithomimus Affinus*. The *Saurischia* include the *Grallator*, *Kayentapus*, the Indeterminate Theropod, the *Anchisaurus*, and the *Ornithomimus Affinus*. The *Ornithischia* group include the *Atreipus*, *Gregaripus*, *Anomoepus*, and the *Tenontosaurus*. In the future, it is likely that other new types of dinosaurs will be found in the extensive track ways which exist in the Connecticut Valley region.

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